Example #2: Designing A Spiral-Curve-Spiral Combination

Determine the total length of the SCS combination based on the information provided below:

Δ_c = 37.5231º   R= 2000 ft

Road is a rural principal arterial

ADT = 1500

Posted speed = 50 mph

Rolling terrain, 12-ft lane highway

Using formula: $L_{s,ft} = 1.6 \, V^3_{mph}/R_{ft}$
Calculate $L_{s,ft}$
$L_{s,ft} = 1.6(50)^3/2000$
$L_{s,ft}$ = 100 ft

Using MoDOT Standard Drawing 203.20 page 2/5
Select $L_{s,ft}$ from table:
Emax=8% , 50mph, 24ft
$L_{s,ft}$ = 122 ft

SUPERELEVATION AND WIDENING TABLE. e_{max}= 8%

DESIGN SPEED	30 M.P.H. OR LESS					40 M.P.H.					50 M.P.H.					60 M.P.H.					70 M.P.H.			
NORMAL SURFACE WIDTH			20'	22'	24'			20'	22'	24'			20'	22'	24'			20'	22'	24'			22'	24'
RADIUS (FEET)	e%	L	W			e%	L	W			e%	L	W			e%	L	W			e%	L	W	
17000	NC	0	0	0	0	NC	0	0	0	0	NC	0	0	0	0	NC	0	0	0	0	NC	0	0	0
14000	NC	0	0	0	0	NC	0	0	0	0	NC	0	0	0	0	NC	0	0	0	0	RC	60	0	
12000	NC	0	0	0	0	NC	0	0	0	0	NC	0	0	0	0	NC	0	0	0	0	RC	60	0	
10000	NC	0	0	0	0	NC	0	0	0	0	NC	0	0	0	0	RC	53	0	0	0	2.1	63	0	
8000	NC	0	0	0	0	NC	0	0	0	0	NC	0	0	0	0	2.1	56	0	0	0	2.6	78	0	
6000	NC	0	0	0	0	NC	0	0	0	0	RC	48	0	0	0	2.7	72	0	0	0	3.4	102	0	
5000	NC	0	0	0	0	RC	41	0	0	0	2.4	58	2.0	0	0	3.2	85	0	0	0	4.1	123	0	
4000	NC	0	0	0	0	RC	41	2.0	0	0	2.9	70	2.0	0	0	3.9	104	0	0	0	4.9	147	0	
3500	NC	0	0	0	0	2.3	48	2.0	0	0	3.2	77	2.0	0	0	4.4	117	0	0	0	5.5	165	0	
3000	RC	36	2.0	0	0	2.6	54	2.0	0	0	3.7	89	2.5	0	0	5.0	133	0	0	0	6.3	189	0	
2500	RC	36	2.0	0	0	3.0	62	2.5	0	0	4.3	103	2.5	0	0	5.7	152	0	0	0	7.2	216	0	
2000	2.4	44	2.5	0	0	3.7	77	2.5	0	0	5.1	122	2.5	0	0	6.6	176	2.0	0	0	7.9	237	0	
1800	2.6	47	2.5	0	0	4.0	83	3.0	0	0	5.5	132	3.0	2.0	0	7.1	189	2.0	0	0	MIN. RADIUS = 1820'			
1600	2.9	53	2.5	0	0	4.4	91	3.0	0	0	5.9	142	3.0	2.0	0	7.5	200	2.0	0					
1400	3.2	58	3.0	0	0	4.8	99	3.0	2.0	0	6.4	154	3.0	2.5	0	7.8	208	2.5	0					
1200	3.6	65	3.0	2.0	0	5.4	112	3.5	2.5	0	7.0	168	3.5	2.5	0	MIN. RADIUS = 1205'								
1000	4.2	76	3.5	2.5	0	6.0	124	3.5	2.5	0	7.6	182	3.5	3.0	2.0									
900	4.5	82	3.5	2.5	0	6.4	132	4.0	3.0	2.0	7.8	187	4.0	3.5	2.5									
800	4.9	89	4.0	3.0	2.0	6.8	141	4.0	3.0	2.0	8.0	192	4.5	3.5	2.5									
700	5.3	96	4.0	3.0	2.0	7.2	149	4.5	3.5	2.5	MIN. RADIUS = 750'													
600	5.8	105	4.5	3.5	2.5	7.6	157	5.0	4.0	3.0														
500	6.4	116	5.5	4.5	3.5	8.0	165	5.5	4.5	3.5														
450	6.7	122	5.5	4.5	3.5	MIN. RADIUS = 465'																		
400	7.1	129	6.0	5.0	4.0																			
350	7.5	136	7.0	6.0	5.0																			
300	7.8	142	7.5	6.5	5.5																			
250	8.0	145	9.0	8.0	7.0																			

MIN. RADIUS = 250'

From AASHTO Values for Design Elements Related to Design Speed & Horizontal Curvature where e_{max}=8% (Exhibit 3-23)
L_s = 168 ft